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ABSTRACT

This paper summarizes current knowledge from research on teacher effectiveness and discusses the relationship between those findings and educational policy. Few teaching strategies have been studied in different types of environments, so validated knowledge on teacher effectiveness exists for only a few issues. Research findings discussed include: the amount of learning by pupils is related to exposure to content; teachers maximizing pupil learning allocate more classroom time to academic activities; learning is maximized when pupils move briskly through curriculum and experience consistent success; learning is greater where pupils are taught and supervised by teachers rather than working on their own; greater learning is associated with frequent presentation of materials and practice and application of what is learned; pupil morale and achievement are higher in relaxed, supportive classrooms; and teacher beliefs about students correlate with pupil achievement. The relationship between research on teaching and policy is complex and indirect--the authors define the differences between the cultures of research and policymaking and stress the importance of including teacher effectiveness research findings and concepts in teacher training. They discuss the value of self-study for teachers, the problems of teacher evaluation and merit pay, and areas needing future research, and conclude with a discussion on innovations and improvement.
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Teaching Effectiveness:
Research Findings and Policy Implications^{1, 2}

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his paper summarizes current knowledge concerning teacher effectiveness. More specifically, it synthesizes findings from research on teaching that concern teacher behavior and its antecedents and consequences, and discusses the relationship between those findings and educational policy.

This paper could not have been written 20 years ago. Although research on teacher-effectiveness dates back many years, early studies did not involve classroom observation. Studies that include such observations provide much more information about teacher behavior, and they have proliferated in the past two decades, providing considerable knowledge concerning teacher effectiveness.

The Need

The need for empirical information concerning teacher effectiveness has existed for many years but seems particularly pressing today. Concern for the critical state of American education has recently been expressed in many quarters. For example, Cooperman (1978) suggests that with skills, assignments, and standards down, and grades up, the American education system perpetrates a hoax on parents and students. In a similar vein, National Commission on Excellence in Education (1983) notes that standards in American education have declined sharply in recent years and are now lower than those of most other Western countries.

Although many reasons are offered to explain this critical state, some analysts (~~including President Reagan~~) assign at least partial responsibility to American teachers and urge that merit pay be awarded to some teachers. A number of states are now considering the passage of related legislation. Furthermore, several states have passed legislation requiring teachers to possess certain knowledge and teaching skills if they are to be certified. The argument favoring merit pay or competency assessment is obviously viable only if one can differentiate teachers who are and are not effective.

Until recently, leaders of unions in education have argued that it is impossible to make such discriminations. The research findings discussed in this paper provide information that is useful in examining these issues.

Strengths and Limits of Past Research

In seeking to answer questions related to these issues it is imperative that one understands the strengths and weaknesses of the research on which our answers will be based. On the positive side, hundreds of studies have now been completed in which classroom events were observed and information from those observations was analyzed and compared with measurable background conditions and educational outcomes. These studies reflect a wealth of concepts, often involve complex and reliable instrumentation, use sophisticated statistical analyses, and generally report their findings in public forums in which other researchers are encouraged to test the findings claimed. In short, research on teaching resembles other fields of social science research, and claims made by these studies are as well supported as claims made for attribution theory, sociolinguistics, or econometrics.

However, social science research differs from studies in the physical sciences in various ways, and these differences mean that knowledge claims for the former are bound to be weaker than for the latter (Biddle & Anderson, in press). For one thing, many of the experimental manipulations that physical scientists use would not be tolerated if applied to people. For another, social events are complex, and social scientists have yet to agree on a standard vocabulary for describing features of those events. Researchers concerned with teaching, for example, use many vocabularies for describing classroom events. These vocabularies overlap in meaning, and various groups of researchers may use the same term to express quite different concepts or research operations. This means that researchers have difficulty understanding and comparing one another's research, and reviewers of

research on teaching have serious problems in locating and interpreting studies that examine a common topic.

Above all, social behavior is meaningless out of context and is therefore not amenable to study in isolation, as are phenomena in the physical or biological sciences. Traditional methods in physics, for example, assume that an effect obtained in one laboratory should also be obtainable in another laboratory or in an industrial process. In contrast, an effect observed in a classroom conducted with middle-class, sixth-grade, white pupils in a mathematics lesson may not be obtained in a working-class, eleventh-grade, black classroom concerned with social studies or foreign language instruction. This means that effective teaching in one context may not be effective instruction elsewhere. Some characteristics of effective teaching may be general, or nearly so, but others probably reflect teacher, context, and pupil characteristics. The only way to determine which effective strategies are general and which are not is to study a given teaching strategy in various types of classrooms. Few strategies have been studied in diverse contexts, however, because classroom research is expensive and time consuming, and some funding agencies do not appear to understand the need for replication. Thus, widely-validated knowledge for teacher effectiveness currently exists for only a few issues.

Potential Contributions of Research

These weaknesses do not mean that research on teaching is of limited value. On the contrary, any information is better than no information, and each study of teaching helps diminish our ignorance. Moreover, the fact that we should not make the same types of knowledge claims for social research that are made for research in the physical sciences should not blind us to the claims we can make for the former. There are several important contributions that research on teaching can make.

First, research on teaching can generate new concepts for thinking about teaching or for classifying the events of instruction, or innovative propositions about teaching. Good examples of original concepts are found in the research of Kounin (1970), for example, and the influential study of Smith and Geoffrey (1968) provides examples of new propositions concerning effective teaching. Insights such as these are significant because they cause educators and researchers to rethink their basic beliefs about teaching.

Second, research on teaching can generate findings concerning the frequencies with which various types of teaching occur or relationships among teaching events and their potential causes or effects. It is easier to draw negative than positive conclusions from research on teaching. For reasons suggested above, it is difficult to discriminate findings that have truly been established for a broad range of classrooms. In contrast, it takes but one, good study to contradict a fallacious claim for the general effectiveness of a particular teaching strategy. Accordingly, research on teaching has contributed findings that have overturned many previously popular notions concerning teacher effectiveness. *examples?*

Third, research on teaching has the capacity for generating practical innovations in the forms of new procedures or curricula. Examples illustrating the rich practical ~~work~~ appear in various experimental programs that develop teaching strategies for improving classroom instruction (e.g., Good et al., 1983; Anderson et al., 1979; Emmer et al., 1981; Stallings et al., 1978).

Fourth and last, research on teaching can stimulate theories concerning teaching and its effects. In the final analysis, the central purposes of scientific research are to generate and test theories that will enable persons to understand and control their environment. Workable policies for

teacher effectiveness cannot be set until we understand why a given teaching strategy has the effects it has, because only then will we also know the conditions under which it is likely to be ineffective. In fairness, research on teaching has not yet yielded major theories concerning teacher effectiveness. Nevertheless, a number of recent reviewers advocate theoretical synthesis (Biddle & Anderson, in press; Brophy, 1979; Brophy & Good, in press; Good, 1983; Shulman & Sykes, 1983), and such contributions seem likely in the near future.

Of necessity, this paper focuses on the findings that have been generated by research on teaching. This focus should not blind one to the other contributions that are made by this research tradition. One can argue that insight generation, practical innovations for improving teaching, and the development of explanatory theory are more important in the long run than specific findings concerning teacher effectiveness. Nevertheless, research on teaching has produced the latter, too, and to these we now turn.

Research Findings

The findings reported here generally appear in a number of studies that examine a variety of American classroom settings. Most of them were obtained by observing public school teachers working with their regularly assigned pupils during everyday school activities, so they are more likely to generalize to typical public school settings than to special education or to private schools. Most are based on field-study evidence, which means that it is theoretically possible that our causal interpretations of the evidence are not valid. However, in a number of cases these results are also supported in experimental studies where teachers are trained to exhibit specific behaviors, and the results of those treatments are examined for their effect on pupils. Most of the findings we describe concern relationships between teacher conduct and average pupil achievement. The findings

cited are not always general; a few are specific to particular grade levels or subject matter of the lesson. Finally, the results discussed are not our conclusions alone; indeed, most of them represent a broad consensus of findings from recent reviews of the field (Brophy, 1979; Brophy & Good, in press; Good, 1983; Medley, 1979; Rosenshine & Berliner, 1978).

Opportunity to Learn

A good deal of recent advice given to American teachers stresses the advantages of teacher focus on non-intellective content in the classroom. Teachers are advised to spend time meeting the emotional needs of pupils, to provide entertainment in the classroom, to offer many examples so as to make lessons "meaningful." It is presumed that advice of this sort will not only improve the climate of the classroom but that pupils will also be better motivated and will learn more than students in "traditional" classrooms.

The available evidence does not confirm this advice. Instead, the amount of learning by pupils is largely related to exposure to content. This exposure is determined in part by length of the school day and school year, but also by factors under the control of the teacher. Among other things, learning is maximized when teachers view academic instruction as basic to their role, expect students to master the curriculum, and allocate most of the available time to academic activities. Such teachers are businesslike and task oriented in their approach to instruction.

Management of the Classroom and Lessons

A good deal of advice has also been offered concerning the organization of the classroom and lessons. Teachers are urged to "democratize" their classrooms, to encourage discussions among students, to spend considerable time in debate and voting.

are they really? by whom?

Once again, research evidence does not support the thesis that this advice leads to pupil achievement. Teachers who maximize pupil learning gain not only allocate most classroom time to academic activities, they also know how to manage the classroom as an effective learning environment so that most of the time is actually spent in instruction. Lessons run smoothly and without interruption, transitions between activities are brief and orderly, and little time is lost getting organized or having to deal with student inattention or disruption.

Effective teachers adopt managerial strategies that complement the instructional activities they plan. Preferred seating patterns, traffic pathways, and procedures for equipment storage and retrieval are thought out in advance and explained to pupils during the first few days of the school year. The same is true for rules governing classroom conduct, movement around the room to attend to personal needs, use of supplies and equipment, participation in lessons, and accountability for timeliness, completeness, and correctness of assignments. Not only are expectations explained clearly but, if necessary, desired procedures and routines are demonstrated for pupils, who are then given opportunities to practice the procedures and receive corrective feedback. The teacher then follows up by reminding pupils of these procedures when they are supposed to be followed, and by monitoring pupils to make sure that they follow them.

These general expectations and procedures introduced at the beginning of the year are not only maintained throughout the year but supplemented with preventive group management techniques that minimize problems of inattention or disruption by maximizing pupil engagement in academic tasks. Lessons are well prepared and feature smooth, continuous pacing, without loss of momentum due to the teacher's confusion about what to do next or need to obtain or prepare some item that should have been prepared earlier.

Thus, pupils receive a continuous academic "signal" on which to focus their attention. The teacher monitors their attention continuously, ignoring fleeting inattention but intervening to restore attention whenever inattentiveness is prolonged or likely to escalate into disruption. When such intervention is necessary, it is confined as much as possible to eye contact, nonverbal behavior such as moving close to the inattentive pupils, directing academic questions to those pupils, or very brief attention cues. This preserves the "signal continuity" and "momentum" of the lesson, whereas interrupting the lesson to deal with pupil inattention in more salient fashion would distract the attention of the whole group from the academic content to the behavior of deviant pupils.

Effective teachers also maximize pupil task engagement during seatwork. Assignments are at the appropriate level of difficulty for their pupils (easy enough to be completed with relative ease and without frustration, yet new or challenging enough to constitute a worthwhile learning experience or provide needed practice), and are varied sufficiently in form and task demand to sustain pupil interest. Thus, pupils receive seatwork tasks that they are likely to want to do, but in any case will be able to do while working largely on their own. The pupils will also know what work is expected from them, where and how they can get help if they need it, and what other activities are available to them when they finish their assignments. They will also know that completed assignments will be checked and graded, and that remedial instruction followed by redoing of the assignment or completion of a parallel assignment will occur if necessary.

These various facets of preventive classroom management support one another and the teacher's businesslike, task-oriented approach to instruction. Together, these approaches convey to pupils that the teacher is there to teach and the pupils are there to learn, and that most classroom time

will be spent engaged in academic activities. (For a detailed discussion of practical management strategies that teachers can use see Good & Brophy, 1978, in press.)

Success Manipulation

A number of theories have also appeared concerning the most effective ways of motivating pupils in the classroom. Nineteenth-century education stressed the use of punishment for motivation. More recently, teachers have been told that pupils will learn only when they are ready or that the teacher is responsible for making the lesson interesting so that students will develop intrinsic motivation.

Again, these theories do not describe the successful classroom. Rather, research suggests that learning is maximized when pupils move briskly through the curriculum and experience consistent success. For seatwork assignments or other independent activities that pupils will be expected to complete on their own, success rates of 90-100% should be the norm. This is especially true in the early grades and in situations in which pupils are learning basic knowledge or skills that must be applied later in higher level activities. Students can accommodate somewhat greater degrees of challenge and frustration during lessons when teachers are available to provide immediate feedback and help. Even with teacher presence, however, about 75% of teachers' questions should elicit correct answers from the pupils. An inference from this research is that students appear to derive intrinsic satisfaction from completing assigned work successfully.

Active Teaching

Recent educational ideology also suggests a relatively passive role for the teacher. Teachers are encouraged to stimulate pupil leadership, to become resource persons, and to avoid domination of the classroom. This approach stresses the creation of independent pupils who will take over

the tasks of learning and will achieve without direct teacher supervision.

Once again, research findings do not support these claims. Learning is greater in classrooms where pupils spend most of their time being taught or supervised by teachers rather than working mostly on their own or not working at all. These classrooms include frequent lessons (whole-class or small-group, depending on grade level and subject matter) in which the teacher presents information and develops concepts through lecture and demonstration, elaborates this information by giving feedback to pupils following their responses to recitation or discussion questions, prepares pupils for follow-up seatwork activities by giving thorough instructions and leading them through practice examples, and actively monitors progress on the assignments after releasing pupils to work independently. Such teachers convey academic content to pupils personally rather than depending on curriculum materials to do so, although they convey that information mostly in brief presentations followed by recitation or application opportunities, rather than through extended lecturing.

Pupils' learning is affected not only by the sheer quantity of instruction they get from their teachers, but also by the quality of that instruction. One important qualitative aspect is clarity. The most effective instruction is presented in clear, specific language. It is free of vague and ambiguous terms, meaningless abstractions, hemming and hawing, and forays into side issues or irrelevancies.

Related to clarity is the structuring of the content. Pupil learning is improved when teachers not only present material actively but also structure it: beginning with overviews, using advance organizers, reviewing objectives, outlining lesson content and signaling transitions between lesson parts, calling attention to main ideas, summarizing subparts of lessons as

they proceed, and reviewing main ideas at the end. Overviews and outlines at the beginning help pupils to relate new material to their existing knowledge and to recognize integrative concepts that they can use to structure the larger body of information. Internal summaries and clear transitions help students to remain aware of the structure of the information as it unfolds. Reviews help them to integrate the material and relate it to major points. Taken together, structuring elements such as advance organizers, planned redundancy, and appropriate sequencing help pupils not only to retain more information, but to organize and integrate the information they retain more effectively.

Practice and Feedback

A good deal has also been written recently about the stultifying effects of practice and too much focus on low-level skills in the classroom. Teachers are encouraged to raise the level of classroom discourse and to eschew drill activities under all circumstances.

As before, these recommendations do not match research findings for classrooms that maximize pupil achievement. Greater learning gain has generally been found associated not only with frequent presentation of information by the teacher but also with increased opportunities to practice and apply what is learned. These opportunities are especially beneficial when they occur as chances to recite, answer questions, or practice skills during lessons or in other settings where a student is working under the direct supervision of the teacher (and thus is able to get immediate feedback and assistance if necessary). Studies of the cognitive level of difficulty of questions and assignments have produced inconclusive results. It appears that the optimal mixture of questions or assignments will vary with the objectives of the activity and its place in the sequence of instruction provided within larger units. For example, mostly low-level questions and

skill practice assignments should appear early in a unit when basic information is being introduced, but higher-level questions and application assignments should increase in frequency as the unit proceeds toward its conclusion. In any case, the data clearly indicate that learning gain is associated with frequent opportunities to respond to and receive feedback from the teacher. Activities in which pupils work on their own for extended periods of time still have a place, but even here it is important for teachers to make sure that pupils know what to do and how to do it, that they can get help if they need it, and that their work is given appropriate feedback and followup. This applies to homework as well as to in-class seatwork. Hence, much student work has to necessarily focus upon practice and drill; however, it is important that such work focus on helping students to understand concepts and principles and not be mechanical, tedious tasks void of any conceptual value.

Opportunities to perform and receive feedback are important to learning at all grade levels, but the specifics vary. Lessons in the early grades involve basic skill instruction, often in small groups, and it is important for teachers to see that each pupil participates overtly and often. This will mean calling frequently on nonvolunteers who rarely participate on their own initiative, and persistent questioning of reticent pupils who tend to remain silent when unsure of themselves. In higher grades lessons typically are with the whole class and involve applications of basic skills or consideration of more abstract content. Pupils in these grades can usually learn by following the lesson, so that overt participation in the lesson is less important than the teacher's structuring of the content, clarity of statements and questions, and consistent provision of feedback. More complex questions that require a chain of reasoning to develop a response appear at this level, and teachers should pause after asking such questions

in order to give pupils time to think before calling on one of them to respond. If pupils fail to respond or respond incorrectly or incompletely, the teacher should usually work for an improved response by simplifying or rephrasing the question.

At all grade levels, it is important for teachers to wait for a pupil's response, pay careful attention to it, and provide appropriate feedback. At a minimum, the feedback should make it clear both to the respondent and to the other pupils in the group whether or not the response was correct. Correct responses should be acknowledged as such, usually through simple affirmative feedback but occasionally through enthusiastic feedback or praise following outstanding responses (or good responses by pupils who seem to need extra encouragement). Incorrect responses should be labeled as such, and then followed up with explanation and reteaching or with attempts to improve the response by rephrasing the question. Most negation of incorrect responses should be accomplished matter-of-factly, and should communicate the recognition that making mistakes is part of learning. Pupils should not receive personal criticism following mistakes, except in rare cases where the mistakes are due to persistent inattention to lessons or carelessness in working on assignments.

Some types of school learning, especially basic skills, are taught in hierarchically sequenced strands organized so that success at any given level usually requires not only mastery of lower-level skills learned earlier, but the ability to apply them as well. However, pupils typically are not able to retain and apply skills unless they have been mastered to a level of smooth, rapid, correct performance. Consequently, it is vital for teachers to provide remedial instruction and additional practice opportunities to pupils who do not master content or skills the first time they are taught, and to continue to do so until these pupils attain proficiency.

A Supportive Environment

Recent advice for teachers also stresses their responsibility for creating a supportive classroom environment. Teachers are presumed to maximize pupil morale and achievements when the classroom is a relaxed, supportive, and friendly place. Harshness and punishment are to be avoided at all costs, and teachers are encouraged to be sensitive to pupils' needs.

In contrast to most of the other recommendations we have reviewed, these are generally supported by the available research. The strong academic focus we describe in high-achieving classrooms is most effective when conducted within a pleasant, friendly environment. Teachers who maximize pupil learning clearly stress cognitive objectives, but they are not slave drivers, and their classrooms do not resemble sweat shops. They maintain high standards and demand that their pupils do their best, but they are not punitive or hyper critical. Instead, they are perceived as enthusiastic, thorough, and effective instructors, and their classrooms are seen as relaxed, friendly, and convivial. Such teachers are supportive of their pupils, especially those who may be inhibited, frustrated, or alienated.

Much of this support is instructional. Pupils having difficulty mastering the content are given more structured learning experiences, more detailed and redundant explanations, more frequent and individualized opportunities to respond and get feedback, shorter and more closely monitored assignments, and in general more continuous direction and supervision. Support also takes more personal forms, however. Effective teachers get maximum performance from discouraged pupils not by demanding it (with implied rejection or punishment for failure to deliver), but by fostering it gradually through praise, encouragement, expression of appreciation for effort, and focus of attention on evidence of genuine mastery and progress. Their long-range goals include making these pupils more confident and independent

learners, but in the meantime they are willing to provide pupils with whatever extra direction and support they may need.

Teacher Beliefs About "Disadvantaged" Students

Finally, many critics argue that teachers need to accept the fact that students from minority and poor families who attend inner-city schools need special, distinctive treatment. Although the specific teaching advice and curriculum reform varies, these calls for modification often involve making the curriculum more relevant (e.g., emphasizing career issues rather than academic ones), adjusting the language and work of the curriculum to the child (e.g., use Black English), and allowing the student to succeed without effort and to make visible progress daily (e.g., using simple, basic readers, assignments that deal only with drill, etc.).

As before, research suggests this advice is questionable. Although teachers can expect too much or too little of students, much research conducted in the 1970's shows that teachers are more likely to underestimate pupils whom they perceive as having limited ability or special needs (e.g., language problems), and thus to set low standards and make too few demands upon them. Researchers who have examined this problem contend that such differential treatment almost guarantees that these pupils will progress at slower rates than they would if they were treated more like others. For detailed information about differential teacher behavior toward pupils believed to be less capable, see Allington (1983); Brophy and Good (1974); Cooper and Good (1983); and Good and Brophy (in press).

Research also indicates that some teacher beliefs and behaviors correlate with pupil achievement. In a large study of teacher effectiveness, McDonald and Elias (1976) found a positive relationship between teacher expectations and pupil achievement. Similarly, Rutter et al. (1979) and Rutter (1983) report that higher teacher expectations are associated with

effective schools in which pupils perform at relatively high levels.

Brophy and Evertson (1976) found that teachers who obtained the highest student achievement perceived pupils as capable of completing assigned tasks and viewed themselves as competent in teaching the curriculum.

Teachers who believe that pupils cannot learn or who feel that they cannot teach effectively are unlikely to foster pupil learning. That is, they are unlikely to take the time to grade papers carefully, reteach, or to plan carefully lectures or demonstrations. Although the beliefs, norms, and preferences of teachers are difficult to measure (e.g., Biddle, 1979), there is ample evidence that role beliefs about teaching and teachers' performance expectations for pupils affect classroom teaching, curriculum assignments, and pupil achievement. Teaching is a difficult, demanding, but doable job and to be successful teachers must develop appropriate performance expectations (Good & Brophy, in press).

Conclusion

At least two common themes are evident in the findings reviewed above. One is that academic learning is influenced by the amount and quality of time that pupils spend engaged in appropriate academic tasks. The second is that pupils learn more efficiently when their teachers first structure new information for them and help them to relate it to what they already know, and then monitor their performance and provide corrective feedback during recitation, drill, practice, or application activities that provide pupils with opportunities to develop mastery and use what they have learned. At first, these generalizations seemed confined to the early grades or to basic rather than more advanced skills. However, it now appears that they apply to any body of knowledge or set of skills that has been sufficiently well organized and analyzed so that it can be presented systematically. This knowledge can then be practiced or applied during activities that call for

pupil performance that teachers can evaluate and (if necessary) correct. These generalizations would thus apply to reading comprehension in addition to word attack, for example, and mathematics problem solving as well as computation. The instruction connected with these higher level learning objectives would be more complex and sophisticated than the instruction related to basic skills objectives, but in other respects it should follow the principles outlined above.

Caveats

Although progress achieved by classroom researchers in the last decade is encouraging, the classroom setting is complex and many unexamined and unanswered questions confront classroom researchers and practitioners. Extant data therefore cannot be used to form simple models or prescriptions for successful teaching and learning. This section of the paper describes some general problems that prevent research from being directly translated into practice.

Context

Even the most robust relationships between teacher behavior and student achievement must be qualified by the context of instruction. Usually these interactions between teaching process and context involve but minor adjustments of main findings; however, sometimes the interaction with context (e.g., old or young pupils, students from more advantaged or from homes with fewer resources) sometimes suggest large differences in desirable teacher behavior for certain types of students. As a case in point, although both high and low SES students need active teaching in the elementary school, available research suggests that low SES/low-achieving students need more active instruction and feedback, and higher success rates than do high SES/high-achieving students. Although it is beyond the scope of this paper to provide a detailed review of context specific findings, we do want to

make policymakers aware of the fact that even our most dependable knowledge about teaching effects apply to certain students more than to others.

It is also the case that findings apply more closely to some goals than to others. For example, there is little information about conditions that are associated with achievement in subject areas other than basic skills and virtually no consistent reliable data to describe how teachers can stimulate certain types of student affective growth. Simply put, available research can offer better guidelines for examining practice in certain areas than in others.

Correlational Evidence

Much of the research relating teacher behavior to student achievement is correlational. Although this information is useful, the evidence obtained from such studies allows one only to say that two variables are associated, not that either variable directly influences the other. Fortunately, there is growing experimental evidence that supports the behaviors discussed in the first section of the paper and the outcomes associated with them. Nevertheless, at some grade levels and in certain subject areas, the presumed desirability of many teacher behaviors is based on correlational data. Thus, much time and training might be wasted in training teachers to perform behaviors that do not enhance student achievement.

Nonlinear Relationships

It is clear that many teacher behaviors have a nonlinear relationship with student achievement. A linear relationship means that the teacher behavior and a student outcome measure are directly related—increases in the teaching behavior are associated with similar increases in, for example, student achievement. However, recent data suggest that the relationship between teaching behavior and student achievement is more complex—too much of a particular behavior can be a problem (as well as too little) and the

teaching behavior can appear at the wrong time. Thus, translating a correlation between a teacher behavior and a student outcome measure into practice is fraught with difficulty.

Average Findings Can Be Misleading

Studies of large samples of classroom teachers can yield important profiles of how more and less successful teachers teach. However, these studies often report group averages (consider these hypothetical findings: highly effective teachers use 14.7 minutes per class for development and 8.7 minutes per class for seatwork, praise 3.6 times per hour, ask higher order questions 2.7 times per hour in mathematics but 14.8 times per hour in social studies . . .). Ironically, despite the fact that such group averages may not describe how any single effective teacher actually behaves in class, persons who use research to guide practice sometimes expect all teachers' behavior to be similar to the group average.

Although it may be possible to state general guidelines (e.g., most mathematics lessons need a development phase), the amount of time allotted to development on a particular day must be adjusted according to student characteristics and the lesson being taught (How bright are the students? Is it an introductory or consolidation lesson?). Average figures can be helpful in suggesting ways of thinking about teaching issues and in establishing certain limits. Nevertheless, teachers must adapt concepts and teaching formats to their classes. So too must teachers adapt findings to various students. For example, some students in a class need more structure and encouragement than others.

Quality of Behavior

Studies of teacher behavior for the most part have not examined the quality of observed teaching behaviors. For example, several studies provide reasonable evidence that teachers who organize content and structure

students' introduction to material through advance organizers; active, concrete examples; and lecturing will have more positive effects on student achievement than teachers who make few attempts to structure content. However, because of their verbal fluency and the quality of the examples they present, some teachers may be able to structure a lesson in 2 minutes; other teachers might take much longer. Some concepts may necessitate lengthy introductions. Furthermore, whether a lesson involves new material or review would also be important in determining how long a teacher should spend on the lesson. Although we have fairly precise information about a few classroom behaviors (e.g., the percentage of teacher questions that should be answered correctly), research generally has little to say about the timing and duration of teacher behaviors. Teachers must therefore use their judgment in applying related research findings in their classrooms.

Patterns of Behavior

Good, Grouws, and Ebmeier (1983) argue that most mathematics lessons should include a brief review of assigned work and concepts, active conceptualization of the meaning of the ideas being studied, a chance for students to practice and apply knowledge, and immediate assessment of whether or not students comprehend the lesson. These investigators tested their program in experimental research and concluded that the program generally had positive effects upon student achievement. However, they point out that the sequence and duration of the lesson segments should vary according to student type and subject matter. Furthermore, because the program (reviews, development lesson, controlled practice, reteaching (if necessary) focusing upon meaning of mathematical concepts, seatwork and homework) was tested as a whole, there are no data about the effects of varying one aspect of the program on student achievement. Results of other recent experimental studies are also based on entire programs.

A school district that decides to increase homework without altering other variables will not necessarily increase achievement and may even diminish it (especially if teachers have not prepared students for the homework and have not helped students to develop independent study skills). The effects of a particular variable or behavior are often related to the presence or absence of other variables, and the alteration of a single variable and the effects of alteration on achievement are problematic. As a case in point, research on the Missouri Mathematics Program indicates that the assignment of homework has a large, positive effect on student achievement; however, this finding was obtained in a particular context. Among other factors, students were prepared for the homework assignment, it was a brief and relatively easy task assigned to give students distributed practice, the homework was used in subsequent class work, and students generally were not assigned much homework in other subjects. Thus, when applying research findings to classroom practice one must consider not only sample characteristics, context factors, and the nature of the data, but also the pattern of teaching observed. It would be foolish to recommend that homework should be assigned in all subjects because it was helpful in one subject or to think that if 15 minutes was helpful then one hour would be four times better!

Functionally Equivalent Behavior

The fact that teacher behaviors usually occur as part of a larger pattern also means that different patterns might produce equivalent results. For example, it may not be important whether the three major points of a presentation are summarized at the beginning or the end of the presentation, (but only that a summary occur). Similarly, a teacher can increase the amount of content covered in a variety of ways (e.g., going through lessons more quickly, assigning more reading to be done at home).

The fact that different behavior patterns often result in the same outcome is another reason why process-product data linking teacher behavior to student achievement should not be used in a prescriptive sense in teacher evaluation programs. It seems absurd to penalize teachers who fail to exhibit certain behaviors in the classroom if these teachers obtain as good student performance (e.g., achievement, positive attitudes) as those teachers who follow the prescriptions. Also, if one holds teachers or schools accountable for performance, then performance achieved data must be included in the assessment.

Frequency of Behaviors

Some important teacher behaviors may need to occur only infrequently. For example, there is evidence that explicit reminders of rules and procedures are important aspects of classroom management (Emmer et al., 1981). However, Borg and Ascione (1982) found that because such behavior occurs infrequently, it may be an unreliable measure of teacher effectiveness. That is, if students are properly taught and accept behavioral rules early in the year, maintaining standards may only call for an occasional reminder of rules. Spending too much time reviewing rules is wasteful if they have been properly taught. If observational time is limited, it is therefore difficult to determine whether teacher rule-stating behavior is optimal or not.

Selective Outcome Measures

Furthermore, findings relate more closely to some goals than to others. For example, there is little information about conditions that are associated with achievement in subject areas other than basic skills and virtually no consistent reliable data to describe how teachers can promote student affective growth. Simply put, available research can offer better guidelines for examining practice in certain areas than in others.

In addition, available evidence only describes teachers who obtain relatively high levels of mean classroom achievement (they have positive effects on entire classes) in basic skill areas.

Hence, because many important outcomes of teaching have not been studied, it is inadvisable to equate extant findings about teaching effects with teacher effectiveness per se.

Variation Among Teachers

Perhaps the most important caveat in terms of applying teacher effectiveness literature in field experiments comes from the observation that some teachers use more of the recommended behaviors and use them more frequently than do other teachers, and some use recommended teaching techniques more effectively than others. Hence, although such experiments often produce significant gains in student achievement, they also illustrate that training some teachers does not insure successful adoption of a program or improved student achievement. It may well be that teachers who do not implement all instructional techniques of a program would use more techniques if they were applied in a different format or organizational structure.

Research on Teaching and Policy

The relationship between research on teaching and policy is complex and indirect. Indeed, to some extent the activities of research and policymaking are independent of one another. Although both are legitimate procedures within advanced, industrial democracies, the requirements of these two types of activity are so different that they articulate only poorly with each other. Before examining possible policy implications of findings from research on teaching, some of the problems involved in that articulation are discussed.

The Cultures of Research and Policymaking

Another way for thinking about the relationships between research and policymaking is to examine the cultures of these different activity forms.

In general, the language, traditions, reference groups, methods, and work styles of researchers and policymakers are strikingly different. The culture of the researcher stresses a knowledge of theory and methods, a willingness to let data speak directly, and a reward system based on peer recognition. That of the policymaker is political; the person who makes policy in a democracy will have to answer to an electorate (or to someone who faces an electorate) for the outcomes of policy decisions. If the policymaker is wise, those decisions will reflect theories and evidence, but they will also reflect ideology, expediency, and responsibility. Indeed, researchers do not bear the responsibility that is borne by policymakers, and the former may be resented by the latter if they urge policy strongly.

Given separation between the activities of research and policymaking, it should not surprise us to discover that the former has relatively little effect on the latter. No study of the effects of research on teaching policy has yet been published, to our knowledge, but many educational innovations are adopted without benefit of research (c.f. Bennett, 1976). Caplan, Morrison, and Stambaugh (1975) studied the use of research by policymakers in the executive branch of the federal government, however, and found widely held and positive attitudes towards social research, combined with little evidence of application. Many social researchers also hope that their research will have practical as well as theoretical applications, and clearly this has been the aim of many granting agencies in the past.

Research that becomes policy-relevant incurs costs, of course. As long as the researcher conducts basic research that has no immediate relevance, he or she can make a dubious claim to immunity from the perils of political commitment. But as soon as that research is deemed relevant, the conducting of research becomes a political act. Social researchers have recently been shocked when their budgets were slashed by a conservative government.

Nevertheless, in fairness, those same researchers were willing enough to accept funds from earlier governments that espoused liberal or egalitarian goals which are clearly not shared by our current government. One cannot have it both ways; either research is nonrelevant and free from political constraints, or it is relevant and researchers should be prepared to stand and proclaim their values.

Considering the sharp separation between the cultures of research and policy, how can we facilitate communication between these two realms? Although a thorough answer to this question lies beyond the scope of this paper, one or two points are worth making. For one thing, research on teaching (or any other subject) has a greater effect when it is conducted within an explanatory context. We are all familiar with the impact of such persuasive advocates as Dewey, Bruner, Carl Rogers, or B. F. Skinner. Each of these figures provided a comprehensive, explanatory theory in which research findings could be placed and understood; and each had a significant effect on the conduct of classroom education.

Second, research on teaching has greater potential for affecting policy when it is programmatic; when it builds on a series of studies that use a common set of concepts but represent a variety of methods and data bases. Examples of the effects of programmatic research may be cited for the Missouri Mathematics Project (Good et al., 1983). Such programmatic efforts not only generate a strong data base for knowledge, but policymakers have an opportunity to become familiar with research goals over a number of months and years.

Finally, research on teaching certainly has greater potential for affecting practice when it is brokered, that is, when it is summarized and argued by an advocate whose responsibility is the review of relevant research and the making of recommendations for policy. The ideal broker is

a person who has one foot in the research camp and one in the policymaker's office. He or she should be familiar with both the limitations of policymaking context and the latest, applicable research information. Several models for brokerage have already appeared, and more will probably be developed in the next few years. (Some school districts employ brokers; some R&D Centers have a permanent publicist; some persons are now working as research brokers on a free-lance basis; other, Western countries set up semi-permanent research institutes whose responsibilities include the preparation of advice for governmental policy on teaching.) None of these models seems ideal; but each has obvious advantages when compared with the unworkable notion of expecting the policymaker to spend hours pouring over research publications.

Policy Implications of Research

What, then, are some of the more salient implications for policy of our current knowledge concerning the effectiveness of teaching? Although the knowledge base has limitations and the authors are researchers and not the ideal brokers described above, we view contemporary research on teaching as having several, broad implications for policy.

Preservice Teacher Education

Research in the last decade clearly illustrates that teachers vary greatly in classroom behavior and that this variation is related to student achievement in some subject areas. This is valuable information that should be disseminated in teacher education programs. The policy implications of recent teacher effectiveness research are most immediate and direct at the preservice level, and all teaching candidates should have the opportunity to learn the various findings and concepts that have resulted from these studies. However, these findings should be learned in a decision-making perspective that acknowledges the need to adjust findings to particular classroom

settings or teachers and students (Good, 1983). Among the recent areas of inquiry that merit dissemination in preservice teacher education programs are active teaching, time management, general issues of classroom management, and teacher expectations.

In-service Teacher Education

To reiterate, results of recent teacher effectiveness research should be taught in preservice education. Implications of that research for in-service training are more problematic. It would appear that teachers should be made aware of recent knowledge about the effects of teaching since many teachers were educated before that knowledge was available. Nevertheless, it is not clear who will conduct such in-service training and how it should be conducted.

Many principals and curriculum supervisors are not well informed about recent research results, nor can they reliably identify more and less effective teaching. Though it is commonly asserted that the duties of principals and supervisors include the provision of instructional leadership, many persons in these positions were not trained to accomplish this task. Most administrators take only limited course work in curriculum and instruction and have little expertise or appreciation for helping teachers to improve instruction. It seems essential that administrators take more course work (or acquire related experiences) in these areas if the knowledge developed from research on teaching is to be used for improving classroom practice.

If the goal of a school improvement effort is to improve students' basic achievement scores, then we would suggest as has Cohen (in press) that the principal help to make teachers more aware of recent literature on teacher expectations, classroom management, time utilization, and active teaching, and also to coordinate more fully the school curriculum so that students are exposed to a well-ordered and focused curriculum. In particular

Cohen calls for the coordination of school goals, classroom instructional objectives, instructional content and measures of pupil performance. However, it is also the case that coordination will be more necessary in some schools than in others and that it is possible to have too much as well as too little coordination.

Despite the obvious nature of this advice, Cohen notes that the occurrence of coordination of goals and processes in schools appears to be far from routine. For example, in many schools the selection of textbooks and tests are not carefully coordinated, and it becomes likely that students will not be tested on what they have been taught or have the opportunity to learn what they are tested on. (See Freeman et al., 1983, for an extended discussion of textbook and achievement test coordination.)

Certainly, in-service teachers need to know about recent research on instructional effectiveness, classroom management, and teacher expectations. They would also benefit from the chance to observe (live, or on videotapes) successful teachers who teach in contexts similar to their own. In-service teachers must respond to a number of goals simultaneously, however, and findings from research on teaching are relevant only to certain goals. Although it has important value, research on teacher effectiveness cannot be equated with effective teaching.

Self-study. The careful study of ways to involve practitioners in self-study and improvement is an important area of inquiry. Teachers seldom have a chance to observe other teachers at work and to share ideas about how to improve instruction. Teachers need more opportunities for classroom observation and more skills for taking advantage of those opportunities. It will be increasingly important to develop models which encourage teacher inquiry and bring recent research findings and concepts to teachers' attention.

Theorists and researchers should develop communication models which disseminate information and also help teachers to adapt new information to their own contexts. Likewise, teachers need to make researchers more aware of the conditions under which they teach. Much more information is needed about when and how to involve practitioners in conducting and applying research. We are just beginning to learn how researchers and teachers can work collectively and profitably together (Griffin, 1983). If their collaborative roles are to be understood, systematic funding to encourage research in this area must be forthcoming. Such research would yield knowledge that would be useful in forming social policy.

Teacher evaluation and merit pay. What does current research tell us about teacher effectiveness? Is it possible to discriminate effective and ineffective teaching? Can one use this information to plan a merit-pay system for encouraging teacher excellence?

Though some authors claim that it is difficult or impossible to discriminate good from bad teaching, findings contradict this assertion. Not only is it possible to identify good teaching, but a number of behaviors that produce effective teaching have now been uncovered.

Whether this information can or should be used as the basis of a merit-pay system is another matter. First, effectiveness of teaching should be judged from observable, classroom events as well as from student performance. This means that any effective system for evaluating teachers should be based on classroom observation, which is expensive. Second, no findings indicate that teachers would improve their teaching if they were subjected to comparative evaluation and merit pay. Indeed, some teachers are likely to adopt any of several strategies that interfere with teaching in order to look effective on a comparative-evaluation system. In addition, evidence indicates that many teachers will adopt more effective strategies for

teaching when they are merely provided clear information and encouragement for doing so (Good & Brophy, in press).

Taken together, then, the evidence suggests that although effective teaching can be discriminated, the use of this information for comparative evaluation and merit pay is likely to be expensive, divisive, open to bias, and perhaps less likely than other strategies to lead to the improvement of classroom teaching. Although numerous writers argue that teachers should be decision-makers (Amarel, 1981; Shulman, 1983; Good, 1983; Good & Brophy, in press), many simplistic observation systems that school districts use to evaluate teacher behavior almost guarantee that issues concerning the sequence and duration of teacher behavior are prejudged, regardless of the content or quality of a teacher's presentation. The use of findings from such observation instruments is inappropriate and is likely to negatively affect teachers and students.

It is important too that the specific issue of merit pay can be separated from the larger issue of career ladders and master teacher programs. Thus, the fact that reliable criteria will be difficult to establish does not mean that we should not try to define levels or stages of professional advancement in teaching. School districts that implement such plans must be certain, though, to define the criteria carefully, revise and review such criteria periodically, and thoroughly study related issues (who sets the criteria, how judgments are actually made) if such plans are to work.

While rewards for teachers are important, a large measure of the potential value of master teacher plans may lie in the discussion they encourage about what constitutes excellence in teaching as citizens, public officials, teachers, and teacher educators debate this issue. A focus on excellence in teaching would emphasize positive aspects of schooling and enable the public to become more aware of the complexities of teaching, and

subsequently a willingness to fund higher teacher salaries. Further, implementing master teacher plans could add to our knowledge of classroom practice and increase our capacity to illustrate to other teachers strategies that are particularly interesting or effective.

Although extant research cannot be used to support master teacher plans, policymakers (including leaders of teacher unions as well as school superintendents) may advocate their use and defend them on other grounds. Master teacher plans are likely to be more useful in some school districts than in others. Still, we suspect that in too many cases master teacher funds will be spent in ways that will not encourage or reward competent teachers.

Future Research

Teacher Training

Knowledge about the effectiveness of teaching to improve the quality of American education can be used to plan in-service programs for teacher training. In fact, programs for the in-service training of teachers have already been developed from research evidence, and findings suggest that these are successful in improving both the classroom conduct of teachers and the achievements of pupils (Anderson et al., 1979; Emmer et al., 1981; Good et al., 1983; Stallings et al., 1978). Additional experimental programs for pre-service teacher training are now being conducted. Developments such as these should be encouraged. Indeed, we urge that federal and state funds now be set aside for the systematic development of new curricula and programs for teacher training that are based on the growing knowledge base from research on teaching.

Selection and Retention of Teachers

Findings from teacher effectiveness research can also provide guidance for policy decisions that affect the selection and retention of teachers,

although additional research is needed to apply findings effectively. To apply our knowledge to the improvement of teaching through selection requires two steps. First, it is necessary to raise salaries and make other conditions for entering teachers more attractive so that schools of education are able to be more selective in accepting students. Second, we must establish reliable relationships between teacher personality characteristics and classroom teaching. Research during the past decade has focused more on process-product issues and has largely ignored relationships between teacher personality and conduct. It seems reasonable that teachers who lack certain skills, are neurotic, or are low in intelligence will have difficulties in the classroom, but to establish details of those difficulties will require additional research.

Teacher retention may pose a greater problem than teacher selection today. Several studies show that those who leave teaching are generally more ambitious, energetic, and talented than those who remain (Schlechty & Vance, 1983). This suggests that our classrooms are increasingly populated by persons having little interest or aptitude for teaching. To reverse this trend will require, once again, that we raise salaries and improve working conditions for teachers. But research evidence concerning relationships between teacher personality and classroom conduct can also be used to assign teachers to grade levels and curricular topics where they will be more successful and satisfied.

Similarly, careful research now on master teacher plans might help us to answer questions like the following: "How much money is necessary for real incentive?" "How can the potentially divisive effects of competition be minimized?" "How should career ladders be structured?"

Standards and Curriculum

The recommendations made so far presume that the teacher is the sole factor affecting pupil conduct and achievement. There is good evidence,

however, that this is not the case. Lundgren (1972) examined a number of classrooms in Sweden and concluded that the major factor controlling pupil achievement was the curricular standard set in classrooms. That is teachers continued academic instruction until pupils reached a performance criterion, and only then did teachers turned to non-curricular activities. Studies of the achievements of girls in mathematics and the sciences in American high schools suggest that they match boys in achievement as long as they continue to take the same courses. Such findings suggest that curricular content, achievement standards, and pupil selection of courses all contribute to academic achievement. The relationships among these factors and classroom teaching are not yet well understood. To illustrate, some teachers clearly have the ability to transcend curricular restrictions and are able to instill a love of the subject and self-directed learning in pupils, but the mechanisms whereby this is done have not yet been studied adequately. We certainly know enough today to predict that school systems will attain higher levels of achievement when they require those levels for graduation or entrance into higher education. Additional research is needed which examines the interactive effects of curricular standards and teacher strategies for encouraging achievement and intrinsic interest in a subject.

Pupil Grouping

The evidence that some teachers respond to variable expectations they hold for pupils by treating some pupils differentially. As a rule, this behavior is pejorative and tends to build corresponding expectations in the minds of pupils. Thus, pupils who are expected to do well are encouraged to achieve and they develop high expectations for themselves, whereas those who are expected to do poorly are more likely to conclude they have limited academic abilities. Not all teachers exhibit these tendencies, and the evidence suggests that those who do can be trained to monitor their behavior and can alter it.

Patterns of differential achievement, however, are often associated with race or ethnicity and may be reified in some schools by grouping procedures which are often an excuse for prejudice. As a rule, brighter pupils seem to learn under a wide variety of teaching strategies. In contrast, slower pupils are more vulnerable to poor teaching, and we waste valuable resources when we consign them to poorer teachers or to pejorative treatment within a common classroom.

Teachers should be encouraged to believe that pupils have individual strengths and weaknesses that differ depending on topic and context, and schools should be prepared to review and intervene on behalf of pupils who are beginning to acquire a reputation that would interfere with their fair treatment. Still, there surely is a limit to the range of students that a single teacher can deal with in particular subject areas and make adequate progress. Educators also need more research knowledge about the range of students and the content that a teacher can be expected to address in a given year.

Innovations and Improvement

Our final policy recommendation concerns the relationship between program innovation and research on teaching. One of the strengths of American education has been its willingness to experiment with new ideas for teaching. The past generation witnessed the consolidation of schools, the appearance of language laboratories, open-plan schools, educational television, concrete manipulatives, programmed instruction, and the advocacy of literally hundreds of other curricular innovations. Most of these innovations were claimed to have desirable effects on teaching, but there was little evidence to support those claims, and most of these developments have now disappeared. In some cases the spuriousness of claims was discovered by teachers themselves. In others the fact that an innovation did not work

became common knowledge after it was investigated in a few school systems. In the process, however, a great deal of time, effort, and money were invested in poor ideas.

Most of these innovations could have been empirically tested before their wide-spread adoption by American schools. Research on teaching has disposed of many untenable ideas that seemed useful but were found not to work in classrooms. School systems cannot afford to adopt unworkable innovations. It takes only a small investment to pilot-test an idea through research on teaching, and we strongly urge that school administrators demand to see evidence before making a budgetary commitments to educational innovations. Research on teaching should become a permanent feature of all large school systems and should be supported as a matter of public necessity by both federal and state governments. In this regard, the National Commission on Excellence in Education Report (1983) strongly recommended that we validate curriculum materials. Educators and researchers must attend to the quality of teaching and instructional materials if improvements are to be made in understanding classroom learning and in our capacity to achieve both excellence and equity in American public school education.

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